

Artificial Sweeteners Linked to Obesity, Diabetes

Artificial sweeteners promote metabolic dysfunction, destroy gut microbiota, induce glucose intolerance and interact with sweet-taste receptors expressed throughout your digestive system that play a role in glucose absorption and trigger insulin secretion.

By [Dr. Joseph Mercola](#)

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Story at a glance:

- Merisant has created a line of artificial sweeteners fortified with vitamins and minerals under the company's Equal Plus brand and is available in three versions: vitamin C and zinc; B vitamins; antioxidant formula with vitamins C and E.
- The products are marketed as a “good source” of these nutrients, as a single packet provides 10% of the daily recommended value of the added vitamins and minerals.
- The addition of vitamins and minerals does absolutely nothing to change the artificial sweetener's detrimental impact on your health. Studies have shown artificial sweeteners raise your risk of obesity, Type 2 diabetes, metabolic syndrome and related health conditions.
- Artificial sweeteners promote metabolic dysfunction by interfering with learned responses that contribute to glucose control and energy homeostasis.
- They also destroy gut microbiota, induce glucose intolerance and interact with sweet-taste receptors expressed throughout your digestive system that play a role in glucose absorption and trigger insulin secretion.

According to [2022 statistics](#), nearly 42.4% of American adults and 22.4% of children ages 2 to 19 are now [obese, not just overweight](#).

While the Centers for Disease Control and Prevention (CDC) states that the [COVID-19 pandemic](#), disordered eating and other social determinants helped push these statistics, it's inarguable that [processed foods](#) and sweetened beverages clearly contribute to weight gain.

Unfortunately, many make the mistake of thinking [artificially sweetened products](#) are a healthier option than regular sugar, as they cut down your calories. However, nothing could be further from the truth.

Over the years, an ever-growing number of studies have shown [artificial sweeteners](#) raise your risk of both obesity and Type 2 diabetes — perhaps even to a greater degree than sugar does. One example is an [animal study](#), presented at the [2018 Experimental Biology](#) conference in San Diego.

The study, which explored how different sweeteners affect the way food is used and stored in the body, and how they affect vascular functioning, found both sugar and artificial sweeteners result in impairments, albeit through different pathways.

After being fed a diet high in either artificial sweeteners (aspartame or acesulfame potassium) or sugars (glucose or fructose) for three weeks, detrimental effects were seen in all groups.

All had increased blood lipids (fats), but the artificial sweeteners also accumulated in the blood of the animals, which harmed the blood vessel lining to a greater degree.

The results indicate that artificial sweeteners alter how your body processes fat and produces energy at the cellular level. So, while operating on completely different chemical pathways, they produce the same kinds of health consequences as sugar.

The latest fad: fortified artificial sweeteners

Despite such evidence, the artificial sweetener market continues to thrive.

As reported by [Food Navigator](#), Merisant launched a new zero-calorie sweetener called Sugarly Sweet exclusively on Amazon in late January 2019 and has also created a line of artificial sweeteners fortified with vitamins and minerals.

The fortified sweeteners are sold under the company's Equal Plus brand, and are available in three versions: [vitamin C and zinc](#), [vitamins B3, B5 and B12](#), or [vitamins C and E](#).

The products are marketed as a "good source" of these nutrients, as a single packet provides 10% of the daily recommended value of the added vitamins and minerals. E.G. Fishburne, director of Merisant marketing in North America, told [Food Navigator](#):

"Consumers are looking to get more out of their foods, including more vitamins and nutrients, and that hasn't really permeated into the sweetener space.

"So, we thought it was a natural fit with someone adding a sweetener to their coffee or beverage in the morning. Why not have that added benefit of getting a good source of a vitamin in that as well?"

Well, just because something sounds like a good idea doesn't mean it actually is, and that's certainly the case here. The added vitamins and minerals do absolutely nothing to change the artificial sweetener's detrimental impact on your health.

The metabolic effects of zero-calorie sweeteners

It's important to realize that while [artificial sweeteners](#) have no (or very few) calories, they are still metabolically active.

As explained in the 2016 paper, "[Metabolic Effects of Non-Nutritive Sweeteners](#)," many studies have linked artificial sweeteners to an increased risk for obesity, insulin resistance, Type 2 diabetes and metabolic syndrome.

The paper presents three mechanisms by which artificial sweeteners promote metabolic dysfunction:

1. They interfere with learned responses that contribute to glucose control and energy homeostasis
2. They destroy gut microbiota and induce glucose intolerance
3. They interact with sweet-taste receptors expressed throughout the digestive system that plays a role in glucose absorption and trigger insulin secretion

In addition to the sweet taste receptors on your tongue, you also have sweet taste receptors in your gut, which release signaling molecules into your bloodstream in response to sweet taste, thereby triggering your pancreas to release insulin in preparation for a glucose spike (which is what would happen if you ate sugar).

In short, the artificial sweetener basically tricks your body into storing fat by raising your insulin level, even though the sugar never arrives.

Studies have also demonstrated that when sweet taste and caloric intake are mismatched, your body loses its ability to properly regulate your blood sugar. Sweet taste without calories also [increases appetite](#) and [subjective hunger ratings](#).

Artificial sweeteners are toxic to gut bacteria

Artificial sweeteners also have effects on your gut microbiome that are significantly different from sugar.

While sugar is detrimental because it tends to feed health-harming microbes, artificial sweeteners could easily be considered the worst of the two, as they have been shown to be downright toxic to gut bacteria.

In a 2008 study, [sucralose \(Splenda\)](#) was shown to reduce gut bacteria by as much as 50%, preferentially targeting bacteria known to have important human health benefits.

Consuming as few as seven little Splenda packets may be enough to have a detrimental effect on your gut microbiome.

Aside from the countless side effects associated with an impaired gut microbiome, sucralose has also been linked to a wide variety of other health effects.

For example, according to Cleveland Clinic, when [Splenda](#) upsets the microbiome, it also leads to increased inflammation, which then “can contribute to a variety of problems, including obesity and diabetes.”

More recent research has confirmed and expanded these findings, showing that all currently approved artificial sweeteners disrupt the gut microbiome.

The animal study, published in the journal *Molecules* in October 2018, found aspartame, sucralose, saccharin, neotame, advantame and acesulfame potassium-k all [cause DNA damage](#) in, and interfere with, the normal and healthy activity of gut bacteria.

While all six artificial sweeteners were found to have toxic effects on gut bacteria, there were individual differences in the type and amount of damage they produced:

- Saccharin caused the greatest, most widespread damage, exhibiting both cytotoxic and genotoxic effects, meaning it is toxic to cells and damages genetic information in the cell (which can cause mutations).
- Neotame was found to cause metabolic disruption in mice and raised concentrations of several fatty acids, lipids and cholesterol. Several gut genes were also decreased by this sweetener.
- Aspartame and acesulfame potassium-k were both found to cause DNA damage. Acesulfame potassium-k is commonly found in sports supplements.

Artificial sweeteners may cause muscle breakdown

Other research, mentioned at the beginning of this article, found that in addition to harming blood vessels and raising the risk of obesity and Type 2 diabetes, [artificial sweeteners](#) also caused the breakdown of muscle.

As explained by lead author [Brian Hoffmann, Ph.D.](#), assistant professor in the department of biomedical engineering at the Marquette University and Medical College of Wisconsin:

"[Artificial] sweeteners kind of trick the body. And then when your body's not getting the energy it needs — because it does need some sugar to function properly — it potentially finds that source elsewhere."

Muscle is one such alternative source.

Study: artificial sweeteners increase the risk of cancer

In a groundbreaking 2022 study published in PLOS Medicine, researchers studying 102,865 persons in France found that consumption of artificial sweeteners was associated with an [increased risk of cancer](#). Researchers said:

"Results from this large-scale population-based cohort study suggest a positive association between higher intake of artificial sweeteners (especially aspartame and acesulfame-K) and overall cancer risk.

"More specifically, aspartame intake was associated with increased breast and obesity-related cancers ...

"... While these results need to be replicated in other large-scale cohorts and underlying mechanisms clarified by experimental studies, they provide important and novel insights for the ongoing re-evaluation of food additive sweeteners by the European Food Safety Authority and other health agencies globally."

How artificial sweeteners trick your body into eating more

A paper published in the Yale Journal of Biology and Medicine in 2010 specifically addressed the [neurobiology of sugar cravings](#) and the effect of artificial sweeteners in light of the neurobiology of food reward.

As explained in this paper:

"Food reward consists of two branches: sensory and post ingestive ... The post ingestive component depends on metabolic products of the food ... The post ingestive effects contained both positive and negative neuronal signals separate from mechanical satiety.

"For moderately concentrated nutrients, rats learned to prefer the food associated with regular feeding than "sham feeding," in which the ingested food flowed out of the body through a gastric fistula.

"However, rats did not show preference if highly concentrated nutrients were used. Hypothalamus has been shown to mediate the post-ingestive food reward.

"Hypothalamus secretes various neuropeptides to regulate energy, osmotic balance and feeding behavior ... Increasing evidence suggests that artificial sweeteners do not activate the food reward pathways in the same fashion as natural sweeteners.

"Lack of caloric contribution generally eliminates the post ingestive component. Functional magnetic imaging in normal-weight men showed that glucose ingestion resulted in a prolonged signal depression in the hypothalamus. This response was not observed with sucralose ingestion.

"Natural and artificial sweeteners also activate the gustatory branch differently. The sweet taste receptor ... contain several ligand-binding sites ...

"On the functional level, sucrose ingestion, compared to saccharin ingestion, was associated with greater activation of the higher gustatory areas such as the insula, orbitofrontal cortex and amygdala.

"These pilot investigations are consistent with a revised hypothesis: Sweetness decoupled from caloric content offers partial, but not complete, activation of the food reward pathways.

"Activation of the hedonic component may contribute to increased appetite. Animals seek food to satisfy the inherent craving for sweetness, even in the absence of energy needs.

"Lack of complete satisfaction, likely because of the failure to activate the post ingestive component, further fuels the food-seeking behavior."

'Diet' beverages linked to increased heart problems

In related news, an observational study by the American Heart Association found that, compared to drinking none or just one "diet" drink per week, drinking two or more artificially sweetened beverages per day raises the risk of [stroke, heart attack and early death](#) in women over 50 by 23%, 29% and 16% respectively.

The risk is particularly high for women with no previous history of heart disease, those who are obese and/or African-American women.

The study included more than 81,700 women from the Women's Health Initiative Observational Study, a longitudinal study of the health of nearly 93,680 postmenopausal women between the ages of 50 and 79. The mean follow-up time was close to 12 years.

According to the authors:

"Most participants (64.1%) were infrequent consumers (never or <1/week) of [artificially sweetened beverages] ASB, with only 5.1% consuming ≥ 2 ASBs/day.

"In multivariate analyses, those consuming the highest level of ASB compared to never or rarely ... had significantly greater likelihood of all end points (except hemorrhagic stroke), after controlling for multiple covariates.

"Adjusted models indicated that hazard ratios ... were 1.23 for all stroke; 1.31 for ischemic stroke; 1.29 for coronary heart disease; and 1.16 for all-cause mortality.

"In women with no prior history of cardiovascular disease or diabetes mellitus, high consumption of ASB was associated with more than a twofold increased risk of small artery occlusion ischemic stroke ...

"High consumption of ASBs was associated with significantly increased risk of ischemic stroke in women with body mass index ≥ 30 ..."

In an accompanying editorial, "[Artificial Sweeteners, Real Risks](#)," Hannah Gardener, assistant scientist, department of neurology at the University of Miami, and Dr. Mitchell Elkind suggest drinking pure water instead of no-calorie sweetened beverages, as it is by far the safest and healthiest low-calorie drink there is.

If you want some flavor, just squeeze a little bit of fresh lemon or lime into mineral water. In instances where your cooking, baking or beverage needs a little sweetener, be mindful of your choice.

Healthier sugar substitutes

Two of the best sugar substitutes are Stevia and Lo Han Kuo (also spelled Luo Han Guo). Stevia, a highly sweet herb derived from the leaf of the South American stevia plant, is sold as a supplement.

It's completely safe in its natural form and can be used to sweeten most dishes and drinks.

Lo Han Kuo is similar to Stevia but is my personal favorite. I use the Lakanto brand vanilla flavor which is a real treat for me. The Lo Han fruit has been used as a sweetener for centuries, and it's about 200 times sweeter than sugar.

A third alternative is to use pure glucose, also known as dextrose. Dextrose is only 70% as sweet as sucrose, so you'll end up using a bit more of it for the same amount of sweetness, making it slightly more expensive than regular sugar.

Still, it's well worth it for your health as it does not contain any fructose whatsoever. Contrary to fructose, glucose can be used directly by every cell in your body and as such is a far safer sugar alternative.

Originally published by [Mercola](#).

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